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A case of envenomation by the False Fer-de-Lance snake *Leptodeira annulata* (Linnaeus, 1758) in the Guajira department, Colombia

Case report of envenomation by *L. annulata* in the Guajira

Un caso de envenenamiento por la serpiente falsa cabeza de lanza *Leptodeira annulata* (Linnaeus, 1758) en el departamento de Guajira, Colombia

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All authors participated in writing in the manuscript

Envenomations by colubrid snakes in Colombia are poorly known, consequently, the clinical relevance of these species in the snake bite accidents have been historically underestimated. Herein, we reported the first case of envenomation from opisthoglyphous snakes in Colombia occurred during a fieldwork conditions at the municipality of Distracción, Guajira department. A female biologist was bitten on the knuckle of the index finger of the right hand when she tried to handle a false fer-de-lance snake (*Leptodeira annulata*). Ten minutes after the snake-bite, the patient appeared with symptoms of mild local envenomation such as edema, itching, and pain in the wound. After 40 minutes the edema reached its maximum extension covering the dorsal surface of the right hand and causing its complete mobility loss. The clinical treatment focused on pain control and swelling. No laboratory tests were performed. The patient showed good progress with the total regression of the edema 120 hours after the snake bite accident and normalization of the movements of the limb in one week. Venomous bites from “non-venomous snakes” (opisthoglyphous colubrid snakes) must be consider a significant public health problem, because the patients lose the work capability during hours or days and them are forced to seeking medical assistance for the local envenomation manifestations.

Key words: Colubridae, snake bites, edema**,** poisons, Colombia.

Los envenenamientos por colubridos en Colombia son poco conocidos, en consecuencia, la relevancia clínica de estas especies de serpientes en los accidentes ofídicos ha sido históricamente subestimada. Aquí presentamos el primer caso de envenenamiento por una serpiente opistoglifa en Colombia el cual ocurrió durante condiciones de trabajo de campo en el municipio de Distracción, departamento de la Guajira. Una bióloga fue mordida en el nudillo del dedo índice de la mano derecha cuando trató de manipular una falsa cabeza de lanza o falsa mapanare (*Leptodeira annulata*). Diez minutos después de la mordedura de serpiente, el paciente presentó síntomas de envenenamiento local leve, como edema, picazón y dolor en la herida. Después de 40 minutos, el edema alcanzó su extensión máxima cubriendo la superficie dorsal de la mano derecha causando la pérdida de movilidad completa. El tratamiento clínico se centró en el control del dolor y la inflamación. No se realizaron pruebas de laboratorio. El paciente mostró un buen progreso con la regresión total del edema 120 horas después del accidente ofídico y la normalización de los movimientos de la extremidad en una semana. Las mordeduras venenosas de serpientes “no venenosas” (serpientes colubridas opistoglifas) deben considerarse un problema de salud pública importante, ya que los pacientes pierden la capacidad de trabajo durante horas o días y se ven obligados a buscar asistencia médica para las manifestaciones locales de envenenamiento.

Palabras clave: Colubridae, mordeduras de serpiente, edema, venenos, Colombia.

Snake bite accidents are a serious health issue in the tropical regions, particularly on rural and suburban areas. Among South American countries, Colombia ranks third in the number of snakebites per year (~4,750), and sixth in snakebite incidents per 100,000 inhabitants [~9.1, (1,2)]. Clinically important cases of envenomation by snakes are most often caused by bites from viperid and elapid species (3). Thus, the clinical relevance of colubrid species in the snake bite accidents have been underestimated due to the dearth of envenomation cases reported, the undetermined percentage of colubrid snakes that secrete toxins from an apparatus capable to generate envenomation, the improper taxonomic identification of the snake responsible for the accident, and the ineffective surveillance diseases systems in tropical countries that does not allowed to document the cases of envenomation by colubrid (4).

Snake richness in Colombia overcomes 300 species of which only 18% (~24 viperid species, ~31 elapid species) are potentially dangerous for people (5,6). Hence, most of the Colombian ophidian fauna is compose by harmless colubrid snakes (~187 species). Regardless of these, several snakes from the family Colubridae are considered “non-venomous” despite of they have an opisthoglyphous (rear fanged) dentition and present a mild or high toxicity in their venom (4,7).

Leptodeira annulata (Linnaeus, 1758) is one of these opisthoglyphous colubrid snakes which have a broad distribution that ranges from western Panama, Colombia, Ecuador, Venezuela, Trinidad and Tobago, and Brazil at altitudes between sea level and 1000 m a.s.l (8). Feeds mainly on small frogs and lizards that kill by injection of a venom with proteolytic activity (9). This snake has

nocturnal activity, semi-arboreal habits, oviparous reproductive mode and inhabiting several types of tropical habitats (8-10). In Colombia, this species have a widespread distribution including the Amazonian and Chocoan rainforests, the evergreen forest of the main Andean rivers, the Orinoquian savannas, and the xerophytic forest at the Caribbean coast (6,8). Herein, we describe a snake bite accident caused by *Leptodeira annulata* in a female biologist during fieldwork conditions in the Guajira department, Colombia.

Case report

In 27th April 2018 at 19:20h a 29-year old female biologist was bitten by False fer-de-lance snake (*Leptodeira annulata,* male, SVL= 495 mm, TL= 171 mm, figure 1) on the knuckle of the second digit of the right hand, when she tried to catch the snake during a fieldwork at the municipality of Distracción, Guajira department, Colombia (figure 2A). The snake attached to the knuckle about 10 seconds until she asks for help. Once her fieldwork partner detached the snake from the knuckle the patient had burning sensation and itching on the bitten site which vanished on the following 3 minutes. However, pain at the bitten site was permanent. The bite marks were evident on the injury a few minutes after the bite. After 12 minutes she noticed the emergence of mild edema at the affected site and she applied water and iodized antiseptic on the wound. After 18 minutes, the edema, spread towards the rest of the fingers. The patient applied ice on her fingers, directly through the skin, trying to reduce edema extension (figure 2B). Nonetheless, this treatment did not have effects on the edema growing (figure 2C). After 40 minutes, the edema reached its maximum extension covering the dorsal surface of hand and causing a

complete mobility loss of the fingers and hand (figure 2D). Tourniquet was not used.

After 95 minutes of the snake bite accident, the patient received medical attention at the emergency service of the San Agustin Hospital from Fonseca municipality. She was conscious, oriented and afebrile, and referred mild pain at the affected site, numbness, and difficulty in mobilizing the fingers of the right hand. No systemic symptoms were referred. At the physical examination the patient had mild hypertension (130/90 mmHg), however, the rest of the vital signs were stable. There were signs of edema involving fingers, dorsal surface of the right hand and distal third of the ipsilateral forearm. Appropriate mobility was restricted by the edema for the affected regions. There was no evidence of hemorrhagic blistering, ecchymosis, angioedema, lymphadenopathies, or other relevant signs. The patient had no significant medical or surgical history. The wound was washed again with antiseptics, and clinical supervision was performed for symptomatic management: pain, swelling and potential infection control with intravenous sodium chloride solution, a single intravenous dose of hydrocortisone (400 mg), a single intravenous dose of ceftriaxone (1 g) and tetanus vaccine. The observation was made for approximately 12 hours, with normalization of blood pressure; edema and pain decreased, and moderate recovery of mobility.

The snake was shown to medical practitioner on turn; however, she could not identify the taxonomic identity of the snake or whether the specimen was a venomous snake. Hence, the patient and her fieldwork partner explained to medical practitioner that the accident was not a bothropic envenomation, thus, non-antivenom was applied.

Patient was discharged home with medical prescription (desloratadine 5 mg orally twice a day per 7 days; ciprofloxacin 500 mg orally every 8 hours per 7 days; naproxen 500 mg orally three times a day per 7 days), however, she did not follow it. The edema on the right hand disappeared 120 hours after the snake bite accident and the patient recover the complete mobility of her extremity one week later. Mild pain at the bitten site continued eight days more.

This study agrees with the stated on the following Colombian laws: 84/1989, 14/1986, 3/2001; as well as with the Universal Declaration on Animal Welfare (UDAW) erected by United Nations on 2011. Also, the third author of this study was the patient bitten by False fer-de-lance snake (*Leptodeira annulata*). She signed an informed consent.

Discussion

Among more than 780 Neotropical snakes species, less than 5% (~35 species) colubrid species have cases of envenomation documented [i.e. *Apostolepis spp., Borikenophis portoricensis, Chiroius spp., Clelia plumbea, Coniophanes imperialis, Conophis lineatus, C. vittatus, Crisantophis nevermanni, Cubophis cantherigerus, Erythrolamprus aesculapii, E. bizona, E. miliaris, E. poecilogyrus, Helicops angulatus*, *H. tapajonicus*, *Hydrodynastes gigas, Leptophis ahaetulla, L. diplotropis, Leptodeira annulata, L septemtrionalis* ,*Mastigodryas spp, Oxybelis aneus, Philodryas baroni, P. olfersi, P. patagoniensis, Urotheca elapiodes, Sibynomorphus mikanii, Symphimus spp., Thamnodynastes pallidus, T. strigatus, Tomodon dorsatus, Tropidodryas spp., Xenodon merremii* and *Xenodon severus* (4)]. Particularly, *L. annulata* have only two previous cases of envenomation reported in which the bites have caused only mild local effects as was observed in

the present case of envenomation (11,12), despite of that the venom of *L. annulata* has showed high proteolytic and hemorrhagic activities on experimental studies in rats (13). According with the described by (13,14), it may possible that the edema growing and complete mobility loss of the fingers and hand observed in the patient have mediated by the metalloproteinase's activity associated with the inflammatory mediators.

The present case of envenomation by *L. annulata* as well as previous cases reported agrees with most of the clinical manifestations described in the accidents by colubrid species characterized by mild pain, edema, erythema and transient bleeding, the latter possibly due to the mechanical effect of the bite (15). Also, a progressive coagulopathy and hemorrhagic diathesis can be complicated by acute kidney injury in rare cases (16). However, the relationship between the colubrid venom and the raised blood pressure observed in the patient is currently unclear. There are few reports about transient hypertension in other colubrid envenomation (17), nevertheless, monitor blood pressure and renal function in these patients is recommended.

Traditionally, medical treatment includes supportive therapy with antihistamines and analgesics. In a low proportion, some patients receive treatment with viperid antivenom, which is not a supported recommendation because its neutralizing effect is not demonstrated and the patient should be exposed to suffer severe adverse reactions after the administration of heterologous sera (14,18). Although some reports indicate the use of NSAIDs, antihistamines and corticosteroids, there is no controlled clinical study on its usefulness in such situation. In contrast, administration of tetanus vaccine is recommended (15). Accidents due to

venomous snakes, whose envenoming can cause platelet dysfunction, coagulopathy and hemorrhage syndrome, it has been found that the use of NSAIDs seems to be safe, as well as they not contribute to worsen the hemorrhagic effects (19).

On snake bite accidents caused by colubrid the envenomation degree is suggested to be associated with the continuous attach-bite or multiple bites at the injury area (20). Therefore, detaches the snake from bitten area as fast as possible will contribute to decrease the chance of release and breakthrough the toxin in the tissues. Likewise, in accidents caused by colubrid, even in accidents by viperid or elapid snakes, the secondary infection of the wounds represent around 1% of the cases, likely due to the antimicrobial effect of the venom, which supports the nonuse of prophylactic antibiotics (21). When the use of antibiotics is required, there must be a microbiological demonstration. It is assumed that the oral cavity of the snake can contain a great diversity of Gram-positive and Gram-negative bacteria. Gram-negative microorganisms are susceptible to imipenem and levofloxacin, while Gram-positive are susceptible to azithromycin and amoxicillin/clavulanate (22).

L. annulata is not considered as aggressive snake (9). This snake follows the general antipredator behaviors pattern of hierarchical decision making observed on several venomous and non-venomous snakes see (23,24): First, if a predator stimulus is detected, the reaction is to retreat (escape behavior). Second, if the threatening stimulus persists, the reaction is to employ passive deterrents (head hide, body coiled, crouching, immobility, ball position). And third, if the threat further escalates, the reaction is to engage in aggressive defense (dorsoventral

neck compression, head compression, jump, or bite). Likely, during the snake handling the patient did not aware about antipredator behaviors displayed by snake that could alerted her about the stress caused on the snake. Thus, when the snake displayed aggressive defensive behaviors she could not anticipate the strike, and as result, the snake bite accident occurred.

In Colombia, during the period 2013-2018 the total snake bite accidents have an annual mean of 4160 cases, of which the accidents caused by colubrid snake's ranges from 33 to 128 cases per year (1,25). However, in the same period, more than 1206 cases per year [~29% of the annual mean of snake bites accidents (25)] lack an accurate identification of the snake responsible for the accident, suggesting that the accidents caused by colubrid snakes can be underestimated. (6) point out that one of the main factors that causes inappropriate treatment of the snake bite accident in Colombia is the missidentification, or lack of identification of the snake responsible for the accident by the medical practitioner or medical staff that receive the patient. Therefore, strengthen the knowledge in the medical staff about potentially dangerous snakes for people, as well as generation of tools that allow them to diagnose and implement appropriate treatments must be a priority.

This report depicts the first case of envenomation from opisthoglyphous snakes from Colombia, and support the idea that venomous bites from non-venomous snakes (opisthoglyphous colubrid snakes) must be consider a significant public health problem, because the patients lose the work capability during hours or days and them are forced to seeking medical assistance for the local envenomation manifestations (4,18,20). The recommendations of medical treatment begin with the washing of the area, with water and soap, as well as local antiseptics. The use

of tourniquets or the practice of suction, incisions or local administration of other substances is not indicated (14). Management is predominantly symptomatic and strict monitoring of coagulation times must be carried out, since transient alterations may occur (18).

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Conflicts of interest

No potential conflict of interest is reported by the authors.

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Figure 1. *Leptodeira annulata* specimen (Female, SVL: 495 mm, TL, 171 mm) responsible for the accident. Photo by Tatiana Toro.

Figure 2. Patient injured by False fer-de-lance snake **(***Leptodeira annulata***).** A) Patient trying to handle the snake during a fieldwork at the municipality of Distracción, Guajira department, Colombia. B) Patient applying ice on her fingers trying to reduce the edema extension. C) Edema expanding after 18 minutes over the fingers of the right hand. D) Edema reaching its maximum extension covering the right hand totally and causing a complete mobility loss in the extremity.